

ICSE Board
Class X Mathematics

Time: 2½ hrs

Total Marks: 80

General Instructions:

1. Answers to this paper must be written on the paper provided separately.
 2. You will **NOT** be allowed to write during the first 15 minutes. This time is to be spent in reading the question paper.
 3. The time given at the head of this paper is the time allowed for writing the answers.
 4. This question paper is divided into two Sections. Attempt **all** questions from **Section A** and any **four** questions from **Section B**.
 5. Intended marks for questions or parts of questions are given in brackets along the questions.
 6. All working, including rough work, must be clearly shown and should be done on the same sheet as the rest of the answer. Omission of essential working will result in loss of marks.
 7. Mathematical tables are provided.
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SECTION - A (40 Marks)

(Answer all questions from this Section)

Q. 1

a) If $X = \begin{bmatrix} 1 & -2 \\ 1 & 3 \end{bmatrix}$, $Y = \begin{bmatrix} -3 & 0 \\ 4 & 1 \end{bmatrix}$ and $Z = \begin{bmatrix} 5 & -1 \\ 3 & 2 \end{bmatrix}$, prove that $X(Y + Z) = XY + XZ$. [3]

b) Mr Mohan has a cumulative deposit account for 3 years at 7% interest pa. She receives Rs. 8,547 as a maturity amount after 3 years.

(i) Find the monthly deposit

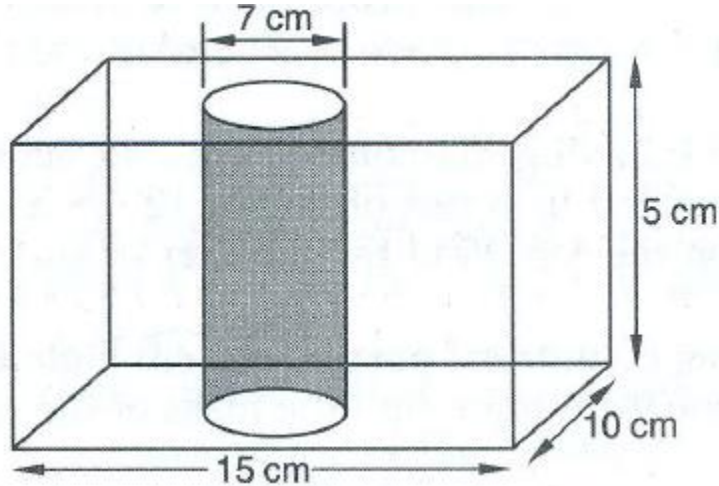
(ii) Find the total interest receivable after maturity [4]

c) Two dice, one white and one red, are rolled together. Find the probability of getting

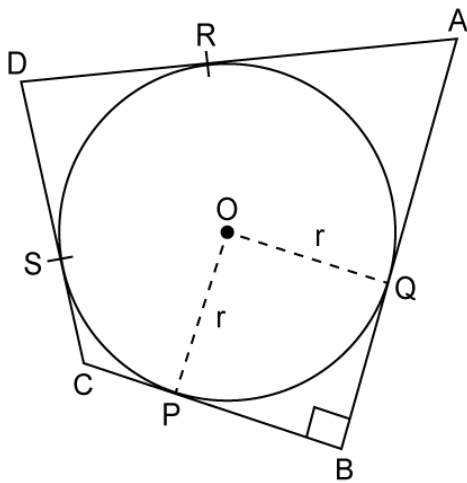
(i) a sum of 6 (ii) two different digits (iii) a difference of 1 [4]

Q.2

- a) From a cuboidal solid metallic block of dimensions 15 cm x 10 cm x 5 cm, a cylindrical hole of diameter 7 cm is drilled out. Find the surface area of the remaining block. (Take $\pi = 22/7$) [3]



- b) Find the middle term of the AP 213, 205, 197, ... 37. [3]
- c) A circle with centre O is inscribed in a quadrilateral ABCD such that it touches the sides BC, AB, AD and CD at points P, Q, R and S, respectively. If $AB = 29$ cm, $AD = 23$ cm, $\angle B = 90^\circ$ and $DS = 5$ cm, then find the radius of the circle. [4]



Q.3

- a) Find the values of m and n when the polynomial $f(x) = x^3 - 2x^2 + mx + n$ has a factor $(x + 2)$ and leaves a remainder 9 when divided by $(x + 1)$. [3]

b)
$$\frac{\cot^2 \theta (\sec \theta - 1)}{(1 + \sin \theta)} + \frac{\sec^2 \theta (\sin \theta - 1)}{(1 + \sec \theta)} = 0$$
 [3]

c)

Class Mark	12.5	17.5	22.5	27.5	32.5	37.5	42.5
Frequency	12	17	22	27	30	21	16

(i) From the distribution given above, construct a frequency table.

(ii) Use the table obtained in part (a) to draw: (1) a histogram, (2) an ogive. [4]

Q. 4

a) P is the solution set of $7x - 2 > 4x + 1$ and Q is the solution set of $9x - 45 \geq 5(x - 5)$, where $x \in \mathbb{R}$. Represent

(i) $P \cap Q$

(ii) $P - Q$

(iii) $P \cap Q'$

on different number lines. [3]

b) ABCD is a rhombus. The coordinates of A and C are (3, 7) and (9, 15). Find the equation of BD. [3]

c) Sum of the areas of two squares is 640 m^2 . If the difference of their perimeter is 64 m, find the sides of the two squares. [4]

SECTION - B (40 Marks)

(Answer **any four questions** from this Section)

Q. 5

a) Five geometric means between $3\frac{5}{9}$ and $40\frac{1}{2}$. [3]

b) Ramesh had Rs. 100 shares of 'Bihar Steel' paying an 8% dividend. He sold them at a market price of Rs. 130 and invested the proceeds in buying Rs. 50 shares of 'Jindal Steel' available at Rs. 75 and paying a 12% dividend. He thus increased his annual income by Rs. 360. How many shares did Ramesh sell? [3]

c) The points P (4, 1) and Q (-2, 4) are reflected in line $y = 3$. Find the co-ordinates of P', the image of P and Q', and the image of Q. [4]

Q. 6

- a) Given four quantities a, b, c and d are in proportion. Show that

$$(a - c)b^2 : (b - d)cd = (a^2 - b^2 - ab) : (c^2 - d^2 - cd) \quad [3]$$

- b) If $A = \begin{bmatrix} 3 & -2 \\ -1 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 2a \\ 1 \end{bmatrix}$, $C = \begin{bmatrix} -4 \\ 5 \end{bmatrix}$, $D = \begin{bmatrix} 2 \\ b \end{bmatrix}$ and $AB + 2C = 4D$, then find the values of a and b. [3]

- c) Prove the following trigonometric identities:

$$\sqrt{\frac{1 - \cos A}{1 + \cos A}} + \sqrt{\frac{1 + \cos A}{1 - \cos A}} = 2 \operatorname{cosec} A \quad [4]$$

Q. 7

- a) The difference of the squares of two positive integers is 180. The square of the smaller number is 8 times the larger, find the numbers. [3]
- b) The actual area of an island is 1872 km^2 . On a map, this area is 117 cm^2 . If the length of the coastline is 44 cm on the map, find the length of its actual coastline. [3]
- c) Find the ratio in which the line $x = -2$ divides the line segment joining $(-6, -1)$ and $(1, 6)$. Find the coordinates of the point of intersection. [4]

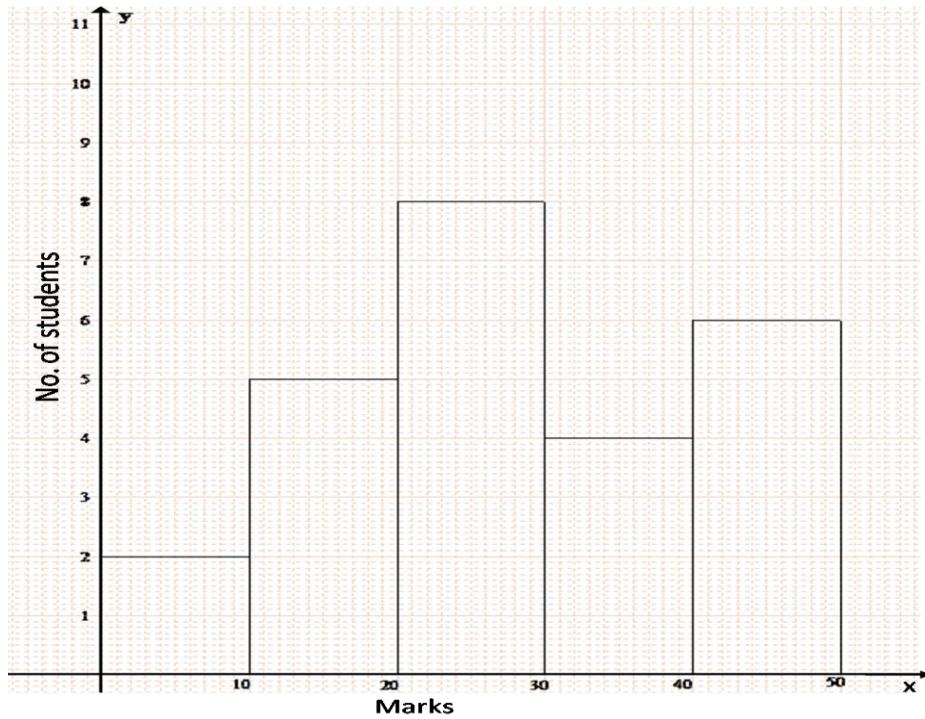
Q. 8

a) The sum of the squares of two consecutive even numbers is 340.
Find the numbers.

[3]

b) The histogram below represents the scores obtained by 25 students in a Mathematics mental test. Use the data to

[3]



(i) Frame a frequency distribution table

(ii) To calculate the mean

(iii) To determine the modal class

c) Draw a circle of radius 3.5 cm. Take two points A and B on one of its extended diameter, each at a distance of 5 cm from its centre. Draw tangents to the circle from each of these points A and B.

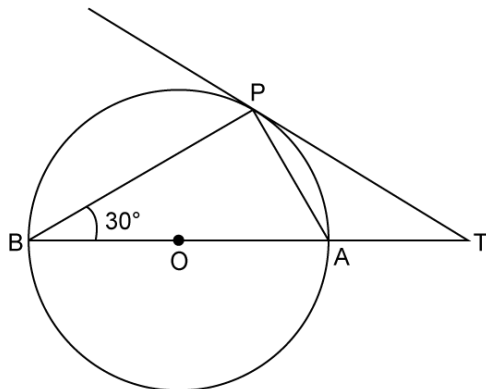
[4]

Q.9

- a) Mr Banerjee opens a recurring deposit account for Rs 3,000 per month at 9% simple interest pa. On maturity, he gets Rs. 1,70,460. Find the period for which he continued with the account. [3]
- b) In ΔABC , DE is drawn parallel to BC . If $AD:DB = 2:3$, $DE = 6$ cm and $AE = 3.6$ cm, find BC and AC . [3]
- c) A cylinder can of internal diameter 6cm contains some water. When a solid hemisphere of diameter 9cm is placed in it is completely immersed. Find the risen water level, if no water overflows. [4]

Q.10

- a) Use the remainder theorem to find the factors of $(a - b)^3 + (b - c)^3 + (c - a)^3$. [3]
- b) In the given figure, O is the centre of the circle and TP is the tangent to the circle from an external point T . If $\angle PBT = 30^\circ$, prove that $BA: AT = 2:1$. [3]



- c) Two points A and B are on the same side of a tower and in the same straight line with its base. The angles of depression of these points from the top of the tower are 60° and 45° , respectively. If the height of the tower is 15 m, then find the distance between these points. [3]

Q. 11

- a) The sum of the first q terms of an AP is 162. The ratio of its 6th term to its 13th term is 1:2. Find the 1st and 15th term of the AP. [4]
- b) The marks of 200 students in a test is given below: [6]

Marks %	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89
No. of Students	7	11	20	46	57	37	15	7

Draw an ogive and find the

(i) the median

(ii) the number of students who scored more than 35% marks